

**INSTRUCTION
MANUAL****ORDER NO. 386S****Model 18 AVT/WB-S Vertical
Radiator, Amateur Antenna**

PN 801856

WARNING

Installation of this product near power lines is dangerous. For your safety, follow the installation directions.

**General
Description**

The Hy-Gain 18AVT/WB-S is an omnidirectional, self-supporting, vertical radiator that operates in the 10, 15, 20, 40, and 80 meter amateur bands. The system will work against earth ground or a resonant radial system when mounted above ground. You make your own radial system following the manual, or you can use the Hy-Gain 14RMQ radial system kit.

Performance of the antenna can be optimized for either phone or CW with either a ground or roof mount. Regardless of the optimization, the VSWR bandwidths of the antenna are broad enough for the antenna to operate at a VSWR of 2:1 or less from 10 to 40 meters. The bandwidth for 80 meters is sharper, because the antenna is top loaded.

The 18AVT/WB-S now features stainless steel hardware for all electrical and most mechanical connections.

**Theory of
Operation**

Heavy-duty "Hy-Q Traps" give automatic band selection. The Hy-Q traps are parallel resonant circuits which isolate the various sections of the antenna. This provides true $\frac{1}{4}$ -wavelength resonance on all bands. The top hat and 80 meter resonator extend coverage to 80 meters by top loading.

Specifications*Electrical*

Frequency	80, 40, 20, 15, and 10 meter amateur bands
Input Impedance	50 ohms
SWR at Resonance	less than 2:1
Power Capabilities	2 kW PEP*
Lightning Protection	DC ground
Input Connector	SO-239

Mechanical

Overall Height 25 ft. (7.62 m) nominal
Mast accepts up to 1 5/8" (4.1 cm)
Wind Survival 80 mph (129 kmph)

*Maximum power on 80 meters is 1 kW PEP

NOTE: If the terminals of the input connector are checked with an ohmmeter, they will show a direct short. *This is normal!* The matching coil in the antenna base puts the entire system at DC ground, but presents a perfect 50 ohm impedance to RF energy.

Choosing a Site

A good ground is imperative for any vertical antenna system.

The 18AVT/WB-S can be mounted on the ground, on a rooftop or on a mast. For best performance, it should be mounted in the clear, away from buildings and other structures. When mounting the antenna above ground, remember that you **must** also install a ground plane radial system similar to that shown in Figure 4.

When the antenna is ground mounted, a radial system is sometimes not needed. In most areas, where soil conductivity is poor and a good ground is not possible, lay out ground radials to improve the efficiency of your antenna system.

Be sure not to mount your antenna close to any buildings using metal/aluminum siding.

If you mount your antenna on a roof and find the roof space is too small for a radial system, you can droop the radials over the edge of the roof at almost any angle without seriously changing the performance of the antenna. The radial system must be insulated from the roof and connected to a good ground for lightning protection.

Assembly and Installation

Read through the manual before beginning assembly. Also, acquaint yourself with the illustrations by checking the parts as you take them from the carton.

Decide where you will mount your antenna (rooftop or ground) and what mode of transmission you will use (phone or CW). Take special notice of the dimensions in Figure 1. The antenna parts must be set to the exact dimensions given or it will not operate at peak efficiency. The VSWR charts will help you decide which dimensions to choose.

WARNING

Isolate the antenna from the reach of children or pets. The antenna radials are hot with RF proportional to the operating power.

CAUTION

The antenna dimensions must be set either for CW operation on all bands or phone operation on all bands. It is not possible to mix phone and CW dimensions to allow operation of some bands on CW and some bands on phone.

NOTE: The compression clamps used with this antenna are used in many varied applications, so the screw head may or may not contact the lockwasher or clamp body. Once it is tight, *do not* force the screw by tightening it further. To do so may damage both the clamp and tubes. Do not tighten any of the compression clamps until instructed to do so.

M1 Section Assembly

Refer to Figure 1 to assemble the main portion of the antenna.

Install a 1 ¼" compression clamp (Item No. 16), untightened, over the M1 section (Item No. 9) (the base is attached to it already). Slip the M2 section, 1 ½" x 26", (Item No. 4) into the top of the M1 and set the M2 at dimension "A", as shown. Slip the clamp into place around the top of the M1 and tighten it just enough to keep the M2 from slipping.

M2 Section Assembly

Install an untightened 1 ½" compression clamp (Item No. 17) over the M2. Then slip the 10-meter trap (Item No. 10) bottom-first into the M2 butting it against the top of the M2. (The top of this trap has a plastic cap on it.)

Slide the clamp into place around the top of the M2 and tighten it just enough to keep the trap from slipping.

M3 Section Assembly

There are two M3 sections supplied—one for ground mounting, 1 ½" x 5 ½", (Item No. 2) and one for roof mount, 1 ½" x 9", (Item No. 5). Choose the correct one for your installation and slide it onto the end of the 10-meter trap. Place a 1 ½" compression clamp (Item No. 17) around the lower end of the M3. Then set the M3 at dimension "B" and tighten the clamp just enough to keep the M3 from slipping.

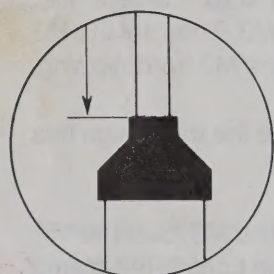
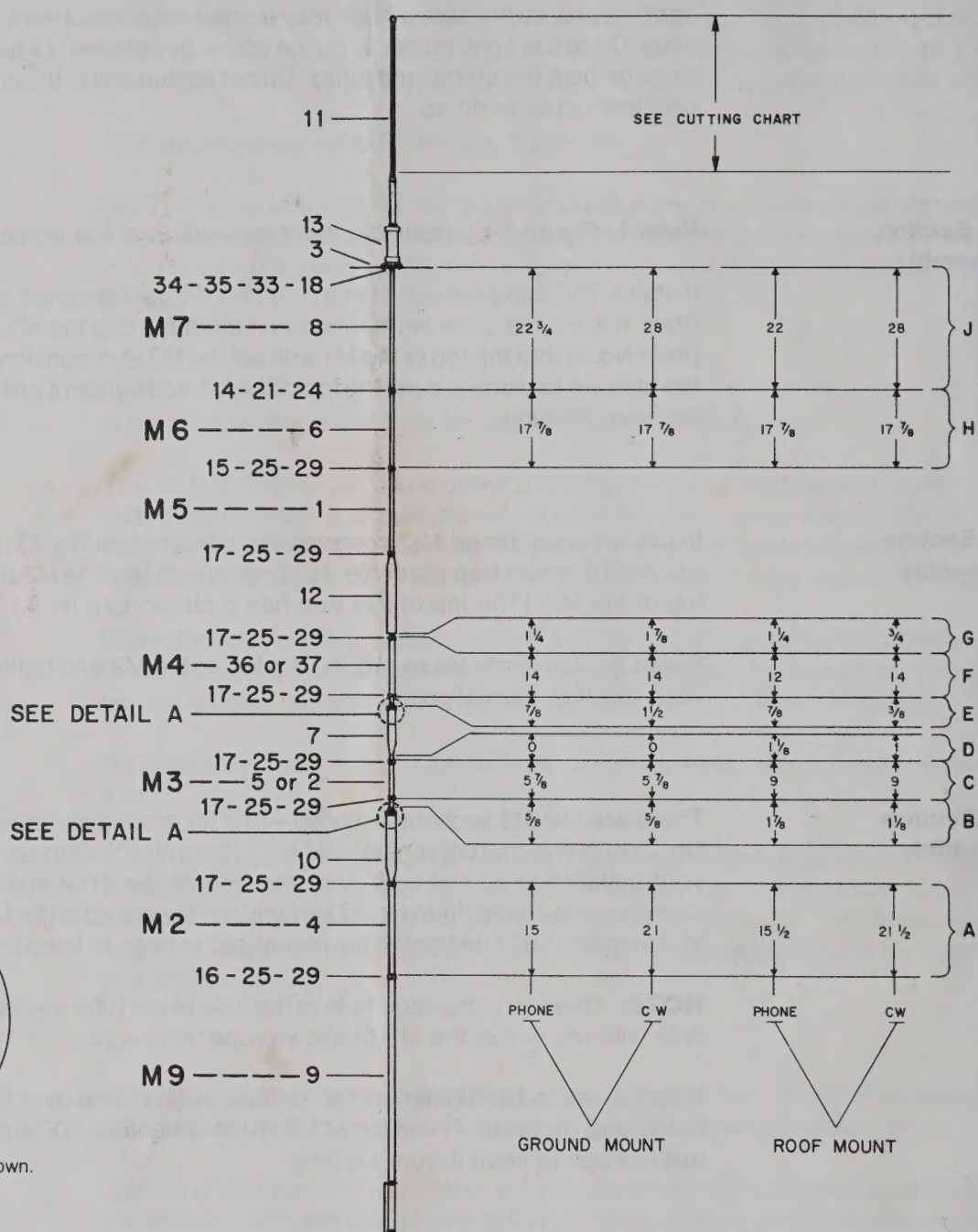
NOTE: There is a drainage hole in the side of the tube above the trap. Align this hole with the slot in the M3 to allow proper drainage.

Install a second, untightened 1 ½" compression clamp over the M3. Slip the 15-meter trap (Item No. 7) into the M3. Set it at dimension "D" and tighten the clamp just enough to keep it from slipping.

M4 Section Assembly

There are two M4 sections supplied—one for ground mount, 1 ½" x 14" (Item No. 36), and one for roof mount, 1 ½" x 12" (Item 37). Choose the correct one for your installation and slide it onto the end of the 15-meter trap. Place a 1 ½" compression clamp around the lower end of the M4. Set the M4 at dimension "E" and tighten the clamp just enough to keep it from slipping.

NOTE: There is a drainage hole in the side of the tube above the trap. Align this hole with the slot in the M4 to allow proper drainage.



Dimensions measured as shown.

DETAIL A

Item No.	Description	Item No.	Description	Item No.	Description
1	Tube, 1 1/8" x 20 1/2", (M5)	10	Trap, 10-meter	21	Bolt, hex head, #10-24 x 1/2"
2	Tube, 1 1/8" x 5 7/8", ground mount (M3)	11	Whip Assembly	24	Nut, square, #10-24
3	Top Radials	12	Trap, 20-meter	25	Bolt, hex head, 1/4"-20 x 3/8"
4	Tube, 1 1/8" x 26", (M2)	13	Resonator, 80-meter	29	Nut, square, 1/4"-20
5	Tube, 1 1/8" x 9", roof mount (M3)	14	Compression Clamp, 3/4"	33	Stud, 3/8"-24 x 1"
6	Tube, 7/8" x 22 1/2", (M6)	15	Compression Clamp, 1"	34	Lockwasher, internal, 3/8"
7	Trap, 15-Meter	16	Compression Clamp, 1 1/4"	35	Nut, hex, 3/8"-24
8	Top Rod, with insert, (M7)	17	Compression Clamp, 1 1/8"	36	Tube, 1 1/8" x 14", ground mount (M4)
9	Base Assembly, (M1)	18	Top Plate	37	Tube, 1 1/8" x 12", roof mount (M4)

Figure 1
Antenna Assembly Dimensions

Install a second, untightened $1\frac{1}{8}$ " compression clamp (Item No. 17) over the M4. Slip the 20-meter trap (Item No. 12) bottom-first into the M4. (The top of this trap is tapered.) Set the trap at dimension "G", slide the clamp into place, and tighten it just enough to keep the trap from slipping.

M5 Section Assembly

Slide the M5 section, $1\frac{1}{8}$ " x $20\frac{1}{2}$ " (Item No. 1), swaged end up, onto the end of the 20-meter trap. Place a $1\frac{1}{8}$ " compression clamp around the lower end of the M5. Butt the M5 against the top of the trap and tighten the clamp just enough to keep the M5 from slipping.

NOTE: There is a drainage hole in the side of the tube above the trap. Align this hole with the slot in the M5 to allow proper drainage.

M6 Section Assembly

Assemble a 1" compression clamp (Item No. 15) over the swaged end of the M5. Slide the M6 section, $\frac{7}{8}$ " x $22\frac{1}{2}$ " (Item No. 6), into the M5. Set the M6 at dimension "H" and tighten the compression clamp just enough to keep the M6 from slipping.

M7 Section Assembly

Slide the M7 section, $\frac{5}{8}$ " x 31" (Item No. 8), insert end up, into the swaged end of the M6. Drop an untightened $\frac{3}{4}$ " compression clamp down over the M7. Set the M7 at dimension "J", slide the clamp around the swaged end of the M6, and tighten it just enough to keep the M7 from slipping.

Recheck all dimensions and *tighten all the clamps securely* in place.

This completes this portion of the antenna. Set it aside to be completed later.

Top Section Assembly

Refer to Figure 2, Top Assembly Details and Figure 3 in connection with the following steps:

Push a $\frac{1}{8}$ " caplug (Item No. 20) on the end of each top radial (Item No. 3).

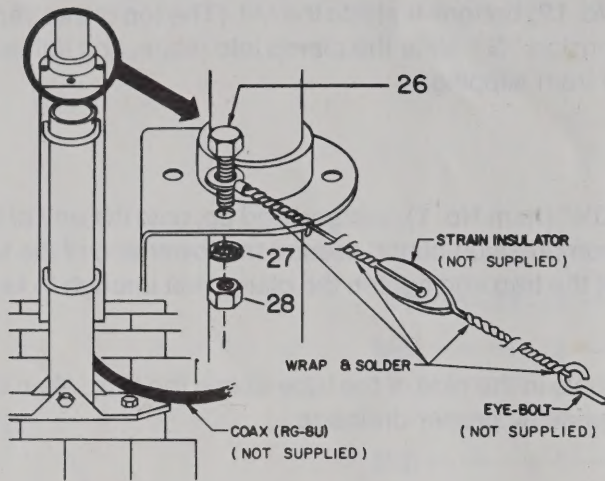
Attach the four radials to the top plate (Item No. 18) as shown. Set the radial assembly aside to be used later.

Determine the proper length for your whip rod as indicated in the cutting chart, Figure 3.

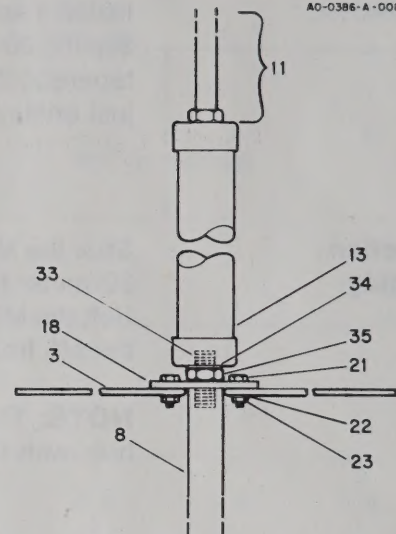
File a deep notch around the rod with a file and snap off as shown in the detail in Figure 3.

Insert two (2) #8 setscrews (part of Item 11) in the top of the whip fitting and insert the whip rod 1 inch into the whip fitting and tighten.

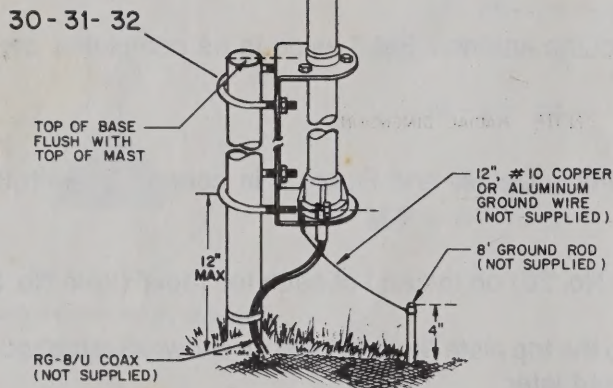
Screw a $\frac{3}{8}$ "-24 nut (Item No. 35) onto the bottom of the whip fitting.



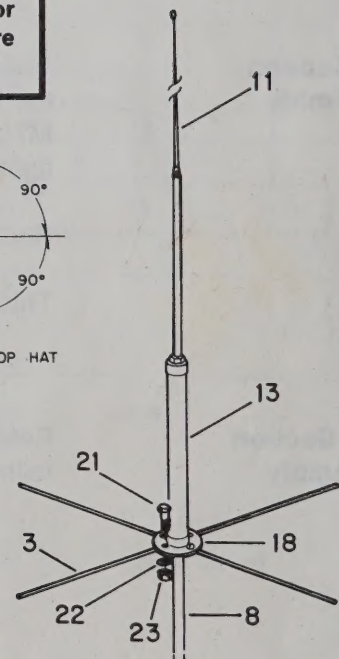
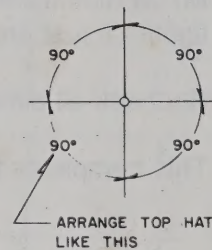
ROOF MOUNTED BASE DETAILS

**WARNING**

When installing your system, take extreme care to avoid any accidental contact with power lines or overhead obstructions. Failure to exercise this care could result in serious or fatal injury.



GROUND MOUNTED BASE DETAILS



TOP ASSEMBLY DETAILS

Item No.	Description
3	Top Radials
8	Top Rod with insert, (M7)
11	Whip Assembly
13	Resonator, 80-meter
18	Top Plate
21	Bolt, hex head, #10-24 x 1/2"
22	Lockwasher, internal, #10
23	Nut, hex, #10-24
26	Bolt, hex head, 1/4"-20 x 3/4"

Item No.	Description
27	Lockwasher, internal, 1/4"
28	Nut, hex, 1/4"-20
30	U-Bolt, 5/16" x 1 1/2" x 2 1/4"
31	Lockwasher, split, 5/16"
32	Nut, hex, 5/16"-18
33	Stud, 3/8"-24 x 1"
34	Lockwasher, internal, 3/8"
35	Nut, hex, 3/8"-24

Figure 2
Top and Mount Details

Screw the completed whip assembly into the top of the white 80-meter resonator (Item No. 13), as shown in Figure 2. The lower end of the resonator has a drainage hole in the side.

Screw the nut down snug against the resonator.

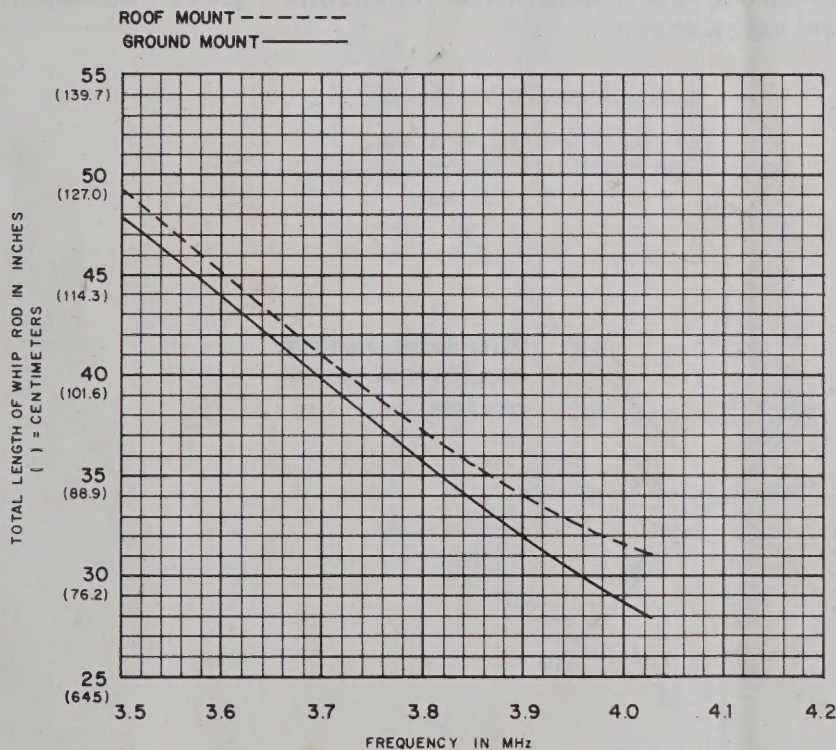
Thread a $\frac{3}{8}$ "-24 x 1" stud (Item No. 25) $\frac{3}{8}$ " into the insert in the M7 section (Item No. 8). Place radial assembly over the stud as shown in Figure 2. Install one $\frac{3}{8}$ "-24 nut (Item No. 35) on the stud and tighten to secure radial assembly.

Place $\frac{3}{8}$ " internal lockwasher (Item No. 34) on $\frac{3}{8}$ " stud so that the lockwasher will be between the nut and the 80-meter resonator.

Thread the whip assembly/resonator (Item Nos. 11 & 13) on the stud and tighten hand tight.

CAUTION

Do not use any tools to tighten the resonator on the M7 section.



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FILE NOTCH
AROUND WHIP
AND SNAP OFF
EXCESS

WHIP ROD
CUTTING CHART
DIMENSION

NOTCH AT WHICH
EXCESS WHIP IS
BROKEN OFF

Figure 3
Cutting Chart for Whip Rod

Installing the Antenna

Refer to the two mounting details in Figure 2 and Figure 4 to install the completed antenna.

First mount the completed antenna on your mast (not supplied) as shown in Figure 2. Use the two (2) $\frac{5}{16}$ " x $1\frac{5}{8}$ " x $2\frac{1}{4}$ " U-bolts (Item No. 30), $\frac{5}{16}$ " nuts (Item No. 32) and $\frac{5}{16}$ " lockwashers (Item No. 31).

Use three (3) $\frac{1}{4}$ "-20 x $\frac{3}{4}$ " bolts, nuts and lockwashers (Item Nos. 26, 27 & 28) to attach the insulator to the upper end of the mounting bracket.

If you are roof mounting your antenna, use four sets of $\frac{1}{4}$ "-20 hardware for the preceding step. Before tightening them, attach two adjacent radials to each set of hardware as shown in Figures 2 and 4.

NOTE: If your antenna is mounted more than 24" above ground, a radial system must be added for proper operation. Also, note that the radial system can serve to guy the system if insulators are used at the proper lengths as shown.

This system *must* be grounded for lightning protection. Connect a ground wire to one U-bolt on the antenna base and run it to a buried, 8' ground rod by the shortest route.

If you are ground mounting your antenna, install it as shown in Figure 2. You must install an 8' ground rod as shown.

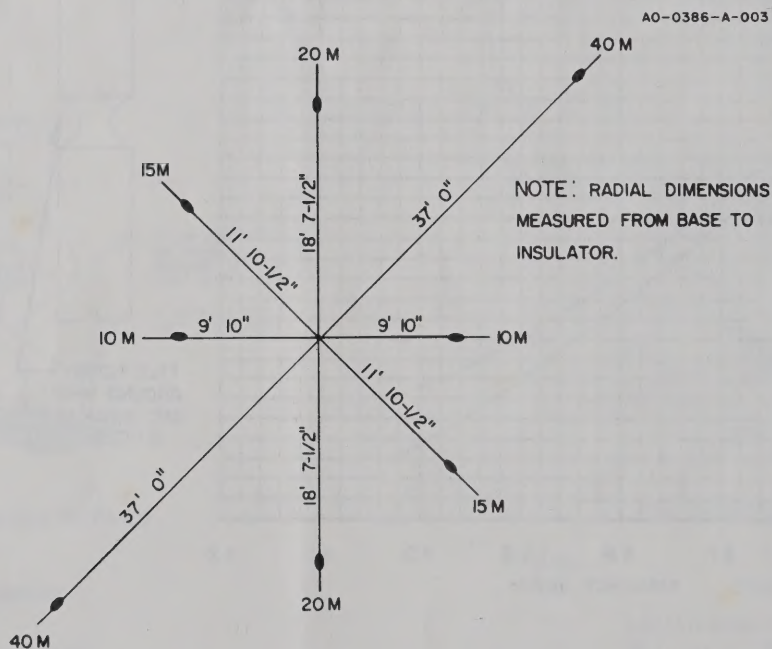


Figure 4
Roof Mounting Radials

Hooking Up the Antenna

Connect your coax (RG-8/u to the SO-239 connector at the bottom of the mounting bracket.

Weatherproof all connectors which will be exposed to rain or ice with Coax-Seal® or another similar substance.

For maximum lightning protection, we recommend the use of a Hy-Gain LA-1 Lightning Arrestor, available from your Hy-Gain dealer.

Your antenna is now ready to use.

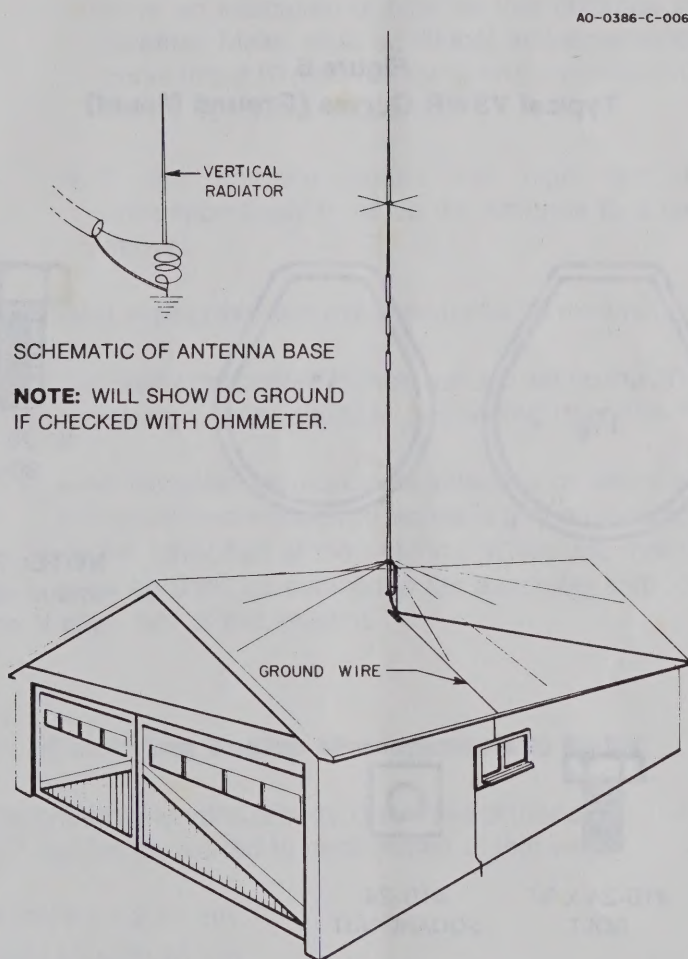


Figure 5
Completed Installation

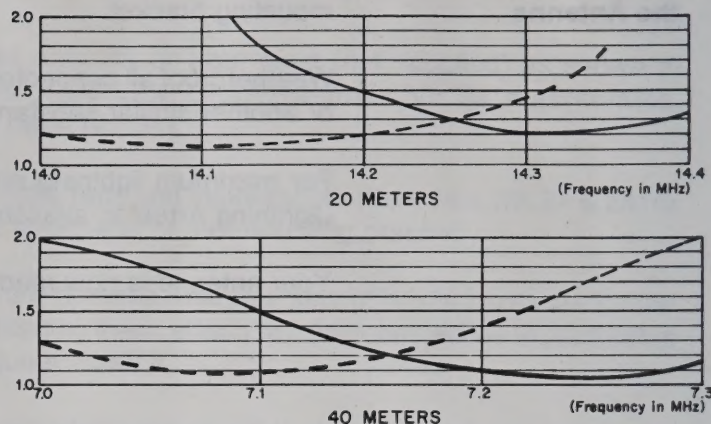
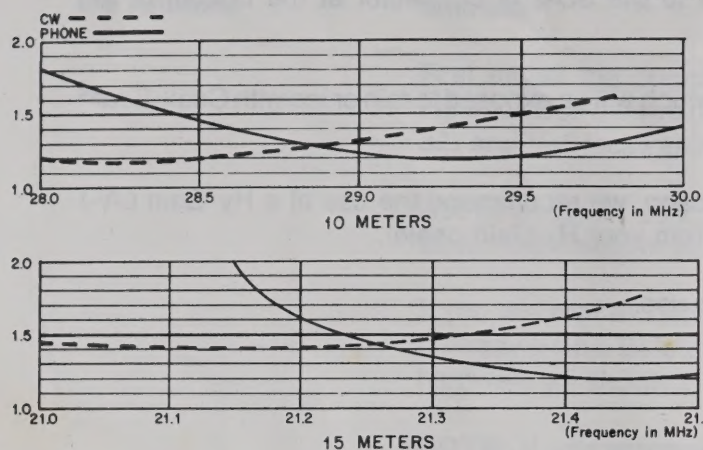
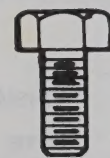
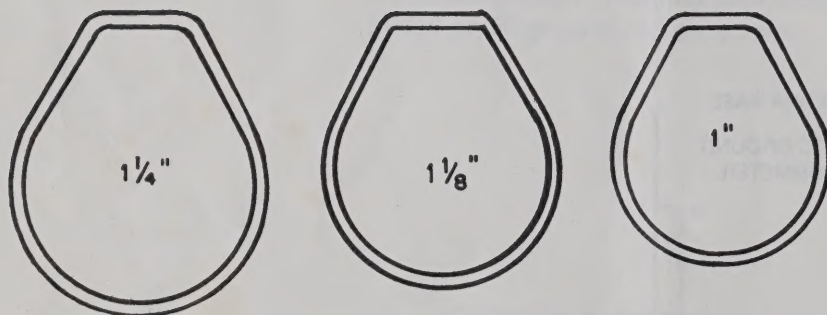


Figure 6
Typical VSWR Curves (Ground Mount)

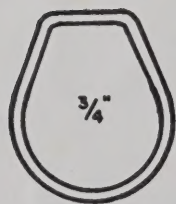


1/4"-20 x 3/8"
BOLT



1/4"-20
SQUARE NUT

NOTE: The 1/4"-20 x 3/8" bolt and 1/4"-20 square nut are used on the 1 1/4", 1 1/8" and 1" compression clamps.



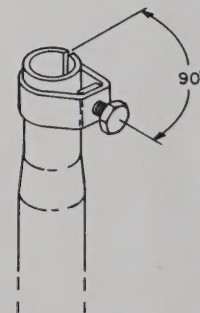
#10-24 x 3/8"
BOLT



#10-24
SQUARE NUT

NOTE: The #10-24 x 3/8" bolt and #10-24 nut are used on the 3/4" compression clamp.

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IMPORTANT

Place compression clamp on the end of tubing with the screw head 90° from the slot in the tubing.

Figure 7
Compression Clamps

**Final Adjustment
for Setting the
12AVQ, 14AVQ
and 18AVT Antennas**

1. The antenna operates progressively from 10 thru the lowest band available. Even though you may not be using 10 meters at the present time, 10 meters must be adjusted, because any adjustment made between the base and the first trap automatically changes all of the bands at a later date.
2. Because every antenna installation is influenced by the soil conditions and the proximity effect of nearby objects, the dimensions in the manual must be fine tuned to put the antenna exactly where you want it on each band.
3. Beginning on 10 meters make a VSWR curve, checking the low end, center and high end of the band. This will indicate if the antenna favors the low end or the high end as installed.
 - A. If it favors the low end, shorten the 10-meter adjustment one inch or no more than 1½ inches. Run another VSWR measurement. Now you will have an indication of how far that distance moved the antenna in your location. Make what additional adjustments are indicated by the VSWR curve to put 10 meters exactly on the portion of the band you desire as your center operation frequency.
 - B. If the antenna favors the high end, lengthen the dimension correspondingly to move the antenna to a lower frequency as outlined above.
4. Next, repeat this same procedure for 15 meters to put that band on frequency.
5. The same procedure is then used to set up the 20-meter band, as well as the remaining bands available, depending upon the model involved.
6. Most verticals are monopole antennas or half of a dipole. For this reason, the soil conditions when the antenna is ground mounted are important as it makes up the other half of the antenna. When you roof mount the antenna, radials must be used as outlined in the assembly instruction manual to provide the other half of the antenna.

Converting English Measurements to Metric

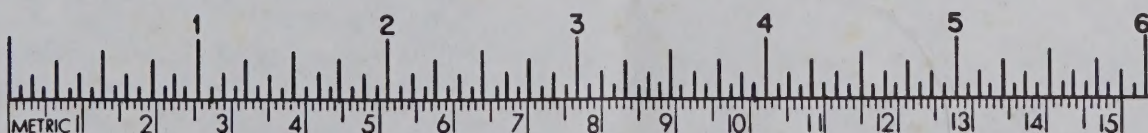
Use this scale to identify lengths of bolts, diameters of tubes, etc. The English inch (") and foot (') can be converted to centimeters in this way.

$$1 \text{ inch (1")} = 2.54 \text{ cm}$$

$$1 \text{ foot (1')} = 30.48 \text{ cm}$$

Example:

$$42" \times 2.54 = 106.7 \text{ cm}$$



Parts List

Item No.	Part No.	Description	Qty
1	170603	Tube, 1½" x 20½" (M5).....	1
2	170606	Tube, 1½" x 5½", ground mount (M3)	1
3	170610	Top Radials	4
4	170612	Tube, 1½" x 26" (M2)	1
5	170621	Tube, 1½" x 9", roof mount (M3).....	1
6	170625	Tube, 7/8" x 22½", (M6)	1
7	870135	Trap, 15-meter	1
8	870136	Top Rod with insert, (M7)	1
9	870137	Base Assembly, (M1)	1
10	870138	Trap, 10-meter	1
11	878793	Whip Assembly	1
12	870169	Trap, 20-meter	1
13	878761	Resonator, 80-meter	1
	872014	Parts Pack 386S, 18AVT-S	1
14	165361	Compression Clamp, ¾"	1
15	168682	Compression Clamp, 1"	1
16	168680	Compression Clamp, 1¼"	1
17	168681	Compression Clamp, 1½"	6
18	170615	Top Plate	1
19	351787	Allen Wrench, No. 8	1
20	455624	Caplug, ⅛", black	4
21	500158	Bolt, hex head, #10-24 x ½"	5
22	565697	Lockwasher, internal, #10	5
23	554071	Nut, hex, #10-24	6
24	555693	Nut, square, #10-24	1
25	500156	Bolt, hex head, ¼"-20 x ⅜"	8
26	505266	Bolt, hex head, ¼"-20 x ¾"	4
27	562961	Lockwasher, internal, ¼"	5
28	554099	Nut, hex, ¼"-20	4
29	551367	Nut, square, ¼"-20	8
30	543792	U-Bolt, 5/16" x 1½" x 2¼"	2
31	564792	Lockwasher, split, 5/16"	4
32	555747	Nut, hex, 5/16"-18	4
33	540037	Stud, ⅜"-24 x 1"	1
34	565696	Lockwasher, internal, ⅜"	1
35	552964	Nut, hex, ⅜"-24	2
36	170271	Tube, 1½" x 14", ground mount (M4)	1
37	170277	Tube, 1½" x 12", roof mount (M4)	1